RECORDING OF INFORMATION

Field of the Invention

The present invention relates to a device and a method for recording information.

Background of the Invention

There are many situations where someone wishes to combine selected parts of text or image information into a document which can be edited by means of suitable software in a computer. A known way of feeding text and image information into a computer is to use a scanner. Scanners of both the stationary and the portable type are available. A stationary scanner is used for scanning whole pages of text and image information, the scanner being passed over the page automatically at a constant speed. This type of scanner is not suitable for scanning selected parts of information on a page. On the other hand, a portable scanner may be suitable for this purpose.

US 5,301,243 discloses a hand-held scanner for scanning characters from a character sequence on a substrate. The scanner, which is passed over the characters which are to be read in contact with the substrate, has an optical system which "sees" a small part of the substrate. The optical system comprises a CCD type line sensor, which has a plurality of light-sensitive elements arranged in a row. When the scanner is passed over the characters on the substrate, a sequence of vertical "slices" of the characters and of the spaces between them is recorded. The "slices" are stored in the scanner as a digital bitmap. Subsequently, OCR software (OCR = Optical Character Recognition) is used to identify the scanned characters and to store them in character-coded format, e.g. with the aid of ASCII code, in a memory. The character recognition can be performed either in the scanner or in an external computer to which the bitmapped characters have been transferred.

Another type of hand-held scanner for inputting text is described in US 4,949,391. Unlike the one described above, this scanner has a two-dimensional sensor, which records images of the underlying surface when the scanner is passed over the same. The scanner can only be moved in a direction determined by a wheel abutting against the surface. Redundant information is removed from the recorded images, which are subsequently combined into a larger image. The larger image can be analysed in a computer for identifying characters.

If a scanner or some other device containing a sensor for imaging information should be capable of recording information at a high degree of selectivity, its field of vision must be fairly small. This means, however, that it will be time-consuming to record large amounts of information. If, on the other hand, the field of vision of the device is made larger, the recording of information will be quicker, but the degree of selectivity lower.

Summary of the Invention

An object of the present invention is to wholly or partly solve the above problems by providing a device which allows both rapid recording of information and a high degree of selectivity.

This object is achieved by a device according to claim 1.

A device for recording information thus comprises a sensor for recording a primary image of the information, a display for showing a secondary image which constitutes at least part of the primary image and control means, by means of which a user can define on which sub-image of the primary image an operation is to be performed.

The device has the advantage that it is possible to scan a large amount of information rapidly at a low degree of selectivity, but still, if required, achieve a high degree of selectivity by there being control means which make it possible for the user to define on which

sub-image of the primary image an operation is to be performed. Instead of providing the selectivity when recording the primary image, the selectivity is thus provided after recording of the primary image by controlling which part thereof is to be used. Which part of the recorded information is to be used is preferably controlled immediately in connection with the recording of the primary image without this being stored permanently. As soon as the operation has been performed, the primary image is discarded. Preferably, the device thus contains only one primary image at a time. In this manner, the device will be memory-efficient.

By operation is in this context meant each operation which a user may want to perform on a sub-image of the primary image, such as saving it, translating the text thereof into another language, showing it on the display and performing OCR thereon.

The primary image thus consists of an image recorded by the sensor. This image can be updated in real time by using the device. It can also be "frozen" by the user at a given moment, in which case subsequent changes of the information which are received by the sensor itself do not affect the primary image.

The secondary image is the image shown on the display. It consists of the entire primary image or a part thereof. If the primary image is updated in real time, also the secondary image will be updated in real time. If the primary image is "frozen", also the secondary image will be frozen. The secondary image is preferably shown directly in connection with the recording of the primary image.

The sensor is advantageously a light-sensitive sensor which can record images. It can be a line sensor which records the primary image by scanning. However, it is advantageously an area sensor which records one or more images. If the field of vision of the area sensor is sufficiently large, it may in some cases be sufficient

to record a single image. Alternatively, images with partially overlapping contents can be recorded and put together to a primary image.

In one embodiment, the control means are adapted to alter, while being actuated by the user, the relationship between the primary and the secondary image so that the extent of that part of the primary image which is shown as the secondary image on the display changes. By actuating the control means, the user can thus zoom in an interesting area in the primary image so that this area is shown as the secondary image on the display. This yields an enlarging action. Of course, the user can also zoom out so that a larger part of or the entire primary image is shown on the display. The zooming is a way of defining the sub-image of the primary image which is to be shown on the display. Moreover the zooming can be used to define the sub-image on which a subsequent operation, for instance the operation "save", is to be performed. For example, the user takes an image of the upper part of the body of a person, but is in fact interested in the face only. He then zooms in the face of the display, clicks a suitable button of the device, whereby the secondary image on the display is saved.

Especially in the case where the contents of the primary image are updated continuously, it is advantageous to fetch the secondary image directly from the area sensor. Furthermore, the control means are then advantageously adapted, when altering the relationship between the primary and the secondary image, to change the size of the area of the area sensor from which the secondary image is fetched to be shown on the display. The user thus controls with the aid of the control means which area of the sensor is to be utilised, in which case the size thereof can be varied continuously from the entire sensor to practically no part of the sensor. It is also conceivable to fetch the secondary image directly from the sensor if the primary image can be frozen thereon.

In another embodiment, which can either be combined with the zooming or be used separately, the control means are further adapted to mark, while being actuated by the user, an area in the secondary image on the display as said sub-image. This is an advantageous way for the user to be able to "cut out" information which is to be saved, translated or used in some other way. The marking involves preferably on the one hand a marking on the display so that the user sees what has been marked and, on the other hand, a marking for a processor in the device that it is this sub-image of the primary image which is to be fetched for performing an operation.

For example, the user can direct the sensor at an object, zoom in an interesting area on the display with the aid of the control means while continuously updating the primary image, freeze the primary image by clicking a button on the device and then marking a certain area on the display by actuating the control means and finally instruct the computer to save the information in the marked area by further clicking of buttons on the device.

The control means can advantageously comprise a first control member, such as a button or knob, which makes it possible for the user to change the size of the marked area in a first dimension. With this control means, the user can, for instance, cut down or increase the marked area on the display in the X direction.

The control means can advantageously also comprise a second control member which makes it possible for the user to change the size of the marked area in a second dimension, for instance in the Y direction.

With two such control members, the user can cut down or increase the marked area to any rectangular field whatever on the display. The control members are advantageously positioned close to the display.

The first and the second control member can be implemented with one and the same mechanical construction.

The control means also comprise software for processing the signals from the control members and for performing zooming and/or marking on the display.

The invention can be applied to any device whatever which is intended for recording information by imaging the information. It is particularly applicable to a device of the hand-held type, where one wants to record information at a low degree of selectivity but operate on it at a high degree of selectivity. By a hand-held type is here meant that the entire device is enclosed in a casing which can be held and used manually. The invention is particularly applicable to a portable scanner. Thus, the device is preferably of the stand-alone type.

The device is particularly advantageous when the operation to be performed is the operation of saving the defined sub-image of the primary image. In this case, a high degree of selectivity is implemented and only relevant information, i.e. the defined sub-image, need to be saved whereas the remainder of the recorded primary image can be discarded as soon as the save operation has been performed.

In a second aspect, the invention relates to a method of recording information according to claim 12 and, more specifically, a method comprising the steps of recording a primary image of the information; showing at least part of the primary image as a secondary image on a display; and altering the relationship between the primary image and the secondary image so that the extent of that part of the primary image which is shown as the secondary image on the display changes. This method solves the same problems and has the same advantages as the zooming described above.

In a third aspect, the invention relates to a method of recording information according to claim 13 and, more specifically, a method comprising the steps of recording a primary image of the information; showing at least part of the primary image as a secondary image on a display;

and marking an area in the secondary image on the display for indicating on which sub-image of the secondary image a subsequent operation is to be performed. This method solves the same problems and has the same advantages as the above-described marking on the display.

The two methods can, as is evident from that stated above, be used separately or in combination. The features that have been discussed for the device apply also in applicable parts to the methods.

Brief Description of the Drawings

The present invention will be described below by way of an example with reference to the accompanying drawings, in which

Fig. 1 is a schematic view of an embodiment of a device according to the invention;

Fig. 2 is a schematic view of the electronic circuitry part in the device in Fig. 1;

Fig. 3 shows schematically how information is transferred from a sensor to a display in connection with zooming in the device in Fig. 1; and

Figs 4a and 4b schematically show how information is marked on the display in the device in Fig. 1.

Description of a Preferred Embodiment

In the embodiment of the device according to the invention shown in Fig. 1, it comprises a casing 1 having approximately the same shape as a conventional highlighter pen. One short side of the casing has an opening 2, which is intended to be directed at the information which the user wishes to image. Information is here to be interpreted in a wide sense. It may consist of text, images or the "reality". The device can be arranged to be held at a distance from what the user wishes to image, in which case it has a camera function, or be held adjacent to what the user wishes to image, in which case it can function as a scanner or take individual images, or the device can be arranged to function at a short distance as

well as at a long distance. Thus the device is of the stand-alone type.

The casing 1 essentially contains an optics part 3, an electronic circuitry part 4 and a power supply part 5.

The optics part 3 comprises one or more light-emitting diodes 6 for illuminating the information carrier, a stationary lens system 7 and a light-sensitive area sensor 8 which constitutes the interface with the electronic circuitry part 4.

The task of the lens system 7 is to image what is within the field of vision of the device on the light-sensitive sensor 8 in a manner which is as correct as possible.

The light-sensitive sensor 8 is in this example a two-dimensional, square CCD unit (CCD = Charge Coupled Device) with a built-in A/D converter. Such sensors are commercially available. In this case, the sensor 8 is mounted on its own printed circuit board 11.

The power supply to the device is obtained from a battery 12 which is mounted in a separate compartment 13 in the casing.

The block diagram in Fig. 2 schematically shows the electronic circuitry part 4. The electronic circuitry part is substantially mounted on its own printed circuit board. It comprises a processor 20, which by the intermediary of a bus 21 is connected to a ROM 22, in which the programs of the processor are stored, to a read/write memory 23 which constitutes the working memory of the processor and in which primary images from the sensor are stored, to a control logic unit 24, to the sensor 8, as well as to the LEDs 6.

The control logic unit 24 is in turn connected to a number of peripheral units, comprising a display 25, which is mounted in the casing, an IR transceiver 26 for transferring information to/from an external computer, and buttons 27, by means of which the user can control the device. Control signals to the memories, the sensor

and the peripheral units are generated in the control logic unit 24. The control logic also handles generation and prioritisation of interrupts to the processor. The buttons 27, the IR transceiver 26, the display 25 and the LEDs 6 are accessed by the processor writing and reading in the register in the control logic unit. The buttons 27 generate interrupts to the processor 20 when they are activated.

The function of the device will be explained below with reference to Figs 3, 4a and 4b. First, suppose that a user of the device in Fig. 1 directs the device at a sheet of paper with text. The user wishes to record part of the information on the sheet of paper. He then activates the device by pressing one of the buttons 27, whereupon the processor 20 activates the sensor 8 to record what is positioned within the field of vision of the device. The image on the sensor is designated a primary image. It goes without saying that the contents of the primary image vary depending on how the user directs the device.

The primary image on the sensor 8 is shown as a secondary image on the display 25. First the secondary image has the same contents as the primary image and is updated continuously so that its contents change as the contents of the primary image recorded by the sensor 8 change. In the normal position, the entire primary image is shown on the display 25.

The user can now use control members, which in this case consist of the buttons 27, to zoom in something that is of particular interest in the primary image on the sensor 8. In the example in Fig. 3, this consists of letters "Q R S T U". When the processor 20 receives a signal via the buttons 27 that zooming-in is to take place, the processor gradually decreases the area on the sensor 8 from which image information is fetched to be shown on the display 25 until the user releases the button 27. A visible enlargement of the information that was

previously to be seen on a part of the display 25 takes place on the display. If the sensor 8 contains more pixels than the display, more information will be supplied to the secondary image in the zooming-in. If the sensor contains the same number of or fewer pixels than the display, no information is supplied, but an interpolation for producing more pixels on the display takes place. Thus, the zooming is pure software zooming which is carried out by changing the area on the sensor 8 which is used to be shown on the display.

When the user has zoomed in on the interesting area, he can "freeze" the image by pressing a button. The freezing means that the primary image is either frozen directly on the sensor which is passivated so as not to record any further changes in the field of vision of the device or by temporary storage of the image recorded by the sensor in the memory of the device, no overwriting taking place when changing the image of the sensor. The freezing also means that no further updating of the secondary image takes place when the image on the sensor 8 changes. The user can continue to zoom in and out in the frozen primary image by using and showing a larger or smaller part of the stored primary image. Thus, also this form of zooming is software zooming.

Now assume that the user has frozen a primary image and that the zooming is such that the secondary image on the display contains the text "This is a pen used for recording" as shown in Fig. 4a. Further assume that the user wants a translation program stored in the device to translate the word "recording". To enable translation, first the image of the word "recording" must be translated into character-coded format by using OCR software (OCR = Optical Character Recognition) stored in the device. For the device to be commanded to character code and translate the correct word, the user marks that part of the secondary image which contains the word "recording". This is carried out by the user using the

buttons 27. It is here assumed that the entire secondary image is marked in the normal position. By pressing one of the buttons 27, the user cuts down the marked part of the secondary image in the X direction. As long as the user presses the button, the image is cut down at an even rate in the X direction, which is shown to the user by a dash 30 moving to the right across the image and by the non-marked part of the image getting lighter. Correspondingly, the user can cut down the part in the Y direction by pressing another button 27, in which case a dash 31 moves continuously downwards across the image and the part above the dash 31 gets lighter.

When the user is satisfied with the marked area, he can, by clicking the buttons 27, provide instructions for character coding and translating. The processor 20 then fetches image information corresponding to the marked area from the primary image and uses this image information as an input signal to an OCR program module and a translation program module.

When the user has obtained the requested translation, he can choose to save it or not. Then the device is ready to be used again for recording a new primary image.

In the same way as described above, the user can take an image of a person, mark the face of the person in the secondary image on the display and save the image of the face only. The non-saved part of the primary image is discarded, which means that the device is sparing of memory since merely the relevant information is saved. The saved information can, if desired, be transferred to an external unit, such as a stationary PC, by means of the IR transceiver 26.

In the above example, the primary image consists of a single image which is recorded by the area sensor 8. It is also possible to use the device as a scanner, in which case it is moved over the information which is to be recorded while the sensor images information by means of a plurality of images with partially overlapping con-

tents. When the user indicates that the desired information has been recorded, the device puts together the recorded images to a composite image of the information. This put-together image then constitutes a primary image recorded by the sensor, and the user can use the control means to define on which part of the primary image a certain operation is to be performed.

In the above example, the sensor is an area sensor. The sensor can be a line sensor instead, which in a conventional manner records a primary image of the information when the device is passed over the information. Then the user can in the same way as above define on which part of the primary image an operation is to be performed.